

Notice of Allowability

Application No.

09/326,214

Applicant(s)

TANITSU ET AL.

Examiner

Art Unit

Alan A. Mathews

2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 2-11-05.
2. ☒ The allowed claim(s) is/are 1-104.
3. ☒ The drawings filed on 03 June 1999 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some* c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 08/147,259 and 08/365,532.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

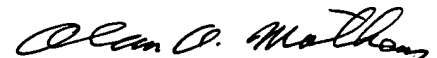
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 11/19/03
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's ~~Amendment~~ Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____



Alan A. Mathews
Primary Examiner

EXAMINER'S COMMENT

1. The Examiner is sending Applicant another copy of an initialed PTO-1449 filed by Applicant on November 19, 2003. The original PTO-1449 filed November 19, 2003, apparently has not been scanned into IFW, even though the cover letter (form PTO-326) of the office action mailed to Applicant on August 17, 2004, indicates that the PTO-1449 was attached.

REASONS FOR ALLOWANCE

2. The following is an examiner's statement of reasons for allowance:

The prior art of record does not disclose or suggest an optical integrator having a plurality of lens elements for forming a plurality of light source images based on a beam from a light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of the rectangular cross section being different in length, the lens element having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side; a light supply means including a light source system for emitting light having a beam cross section of substantially square or circle; light source changing means for forming a plurality of light source images, based on the light from the light source system; and a second relay optical system located between the light source changing means and the

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light source-image forming means, for making a position of the light source images formed by the light source changing means conjugate with a position of the light source images formed by the light-source-image forming means in combination with the other elements recited in independent claims 1 and 16.

The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator⁴ having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; the light supply means including a light source system for emitting light having a beam cross section of substantially square or circle; light source changing means for forming a plurality of light source images, based on the light from the light source system in combination with the other elements recited in independent claim 8.

The prior art of record does not disclose or suggest an optical integrator having a plurality of lens elements for forming a plurality of light source images based on a beam from a light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of the rectangular cross section being different in length, the lens element having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side; a light supply means comprising: a collector mirror having an ellipsoidal surface of revolution; a light source located at one focal point of the ellipsoidal surface of revolution so that light

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emitted therefrom is reflected and collected by the collector mirror; and a collimator lens for converting light collected by the collector mirror into substantially parallel beams in combination with the other elements recited in independent claim 12.

The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator⁴ having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; a light supply means comprising: a collector mirror having an ellipsoidal surface of revolution; a light source located at one focal point of the ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by the collector mirror; and a collimator lens for converting light collected by the collector mirror into substantially parallel beams in combination with the other elements recited in independent claim 13.

The prior art of record does not disclose or suggest an optical integrator having a plurality of lens elements for forming a plurality of light source images based on a beam from a light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of the rectangular cross section being different in length, the lens element having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side; a light supply means comprising: a collector mirror having an ellipsoidal surface of revolution; a light source located at a first focal point of the ellipsoidal surface of revolution so that

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light emitted therefrom is reflected and collected by the collector mirror in combination with the other elements recited in independent claim 14.

The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; and a light source located at one focal point of the ellipsoidal surface of revolution so that light emitted therefrom is reflected and collected by the collector mirror in combination with the other elements recited in independent claim 15.

The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; a light supply means including a light source system for emitting light having a beam cross section of substantially square or circle; light source changing means for forming a plurality of light source images, based on the light from the light source system; and a second relay optical system located between the light source changing means and the light source-image forming means, for making a position of the light source images formed by the light source changing means conjugate with a position of the light source images formed by

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the light-source-image forming means in combination with the other elements recited in independent claim 23.

The prior art of record does not disclose or suggest an optical integrator having a plurality of lens elements for forming a plurality of light source images based on a beam from a light-source-image forming means, said lens elements having a rectangular cross section, two sides adjacent to each other of the rectangular cross section being different in length, the lens element having a same refracting power both in the direction of the longer side of the rectangular cross section and in the direction of the shorter side; a relay optical system disposed between the light source image forming means and the optical integrator, for making a position of the light source images formed by the light-source-image forming means conjugate with a position of the light source images formed by the optical integrator in combination with the other elements recited in independent claim 24.

The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; a relay optical system disposed between the light source image forming means and said internal reflection type integrator, for making a position of the light source images formed by the light source image forming means conjugate with a position of the light source images formed by the

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internal reflection type integrator in combination with the other elements recited in independent claims 29 and 41.

The prior art of record does not disclose or suggest an internal reflection type integrator having two reflection planes parallel to each other for forming plurality of light source images based on a beam from a light-source image forming means, the internal reflection type integrator having a rectangular cross section, two side adjacent to each other of the rectangular cross section being different in length; a relay optical system disposed between the light source image forming means and the optical integrator, for making a position of the light source images formed by the light-source-image forming means conjugate with a position of the light source images formed by the optical integrator in combination with the other elements recited in independent claim 33.

The prior art of record does not disclose or suggest providing an illumination optical system that illuminates a rectangular area on a predetermined plane on which a mask is arranged, and which includes an internal reflection type integrator with an exit plane having a shape substantially equal to that of the rectangular area on the predetermined plane as recited in independent claims 43, 76, and 77.

The prior art of record does not disclose or suggest an optical device which changes an intensity distribution of said illumination beam on a pupil plane of said illumination optical system as recited in independent claims 54.

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The prior art of record does not disclose or suggest an illumination optical system that forms a plurality of light source images in which the number of light source images arranged in a first direction corresponding to a longitudinal direction of the slit area is different from a number of light source images arranged in a second direction crossing the first direction as recited in independent claims 64, 81, and 83.

The prior art does not disclose or suggest the step of changing an intensity distribution of said illumination beam on a pupil plane of an illumination optical system that includes said fly-eye type integrator as recited in independent claims 78 and 80.

The prior art of record does not disclose or suggest an illumination optical system having an internal reflection type integrator on an optical axis of the illumination optical system and an optical device that changes an intensity distribution of an illumination beam on a pupil plane of the illumination optical system as recited in independent claim 84.

The prior art of record does not disclose or suggest an illumination optical system having a pupil plane including a center area and an outer area around the center area, an illumination optical system comprising a first optical integrator on the optical axis and an optical device which makes an intensity distribution increase in the outer area, in comparison with a an intensity distribution in the center area of the pupil plane, and said illumination optical system illuminating the slit area with an illumination beam; and a moveable member arranged to relatively move a mask with respect to the slit area during

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scanning exposure on a substrate with said illumination beam through said mask and hold said mask at a position on or near said predetermined plane as recited in independent claim 93.

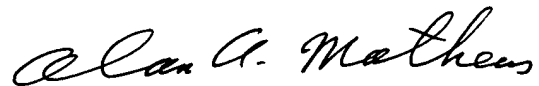
Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan A. Mathews whose telephone number is (571) 272-2123. The examiner can normally be reached on Monday through Friday from 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on (571) 272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Alan A. Mathews
Primary Examiner
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